

WHAT IS CLAIMED IS:

1                   1.       A method for making an aluminum oxide component, the method  
2 comprising:  
3               providing an amount of aluminum oxide in particle form, wherein the aluminum  
4 oxide has less than about 100 parts per million of sodium and less than about 600 parts per  
5 million of silica;  
6               grinding the aluminum oxide with media that comprise aluminum oxide ceramic  
7 pieces that have less than about 200 parts per million of sodium to deagglomerate and reduce  
8 the particle size of the aluminum oxide;  
9               placing the ground aluminum oxide into a slurry;  
10              adding a low sodium grade binder to the slurry;  
11              drying the slurry to provide an aluminum oxide powder having a sodium content that  
12 is less than about 200 parts per million;  
13              forming the powder into a certain shape; and  
14              thermally treating the formed powder to produce an aluminum oxide component  
15 having a low sodium and low silica content.

1                   2.       A method as in claim 1, wherein the powder is thermally treated at a  
2 temperature in the range from about 1580 degrees C to about 1670 degrees C for about 2 to  
3 about 10 hours.

1                   3.       A method as in claim 1, wherein the aluminum oxide component has a  
2 dielectric loss value that is less than about  $5 \times 10^{-5}$ .

1                   4.       A method as in claim 1, wherein the binder comprises polyethylene  
2 glycol.

1                   5.       A method as in claim 1, wherein the slurry is spray dried.

1                   6.       A method as in claim 1, wherein the aluminum oxide has a purity of at  
2 least about 99.8%.

1                   7.       A method as in claim 1, wherein the component is selected from a  
2 group consisting of a microwave window, a cell phone base, and a semiconductor  
3 manufacturing component.

1                    8.        A method as in claim 1, wherein the aluminum oxide in particle form  
2 is produced from mined bauxite.

1                    9.        A method as in claim 1, wherein the ground aluminum oxide is placed  
2 into the slurry using a wet mill process having media that comprise aluminum oxide ceramic  
3 pieces that have less than about 200 parts per million of sodium.

1                    10.      A method as in claim 1, wherein the aluminum oxide has a mean  
2 particle size in the range from about 0.5 microns to about 4 microns after the grinding step.

1                    11.      A ceramic member, comprising:  
2                    a ceramic component comprising aluminum oxide, wherein the aluminum oxide  
3 comprises at least about 99.8% of the ceramic member, wherein the aluminum oxide was  
4 formed from aluminum oxide particles having less than about 100 parts per million of sodium  
5 and less than about 600 parts per million of silica, and that was ground with media that  
6 comprise aluminum oxide ceramic pieces that have less than about 200 parts per million of  
7 sodium.

1                    12.      A ceramic member as in claim 11, wherein the ceramic member  
2 contains less than about 200 ppm of sodium.

1                    13.      A ceramic member as in claim 11, wherein the ceramic member  
2 contains less than about 1,500 ppm of silica.

1                    14.      A ceramic member as in claim 11, wherein the ceramic component is  
2 fashioned in the shape of a cell phone base station.

1                    15.      A ceramic member as in claim 11, wherein the ceramic component is  
2 fashioned in the shape of a vacuum chamber cover.

1                    16.      A ceramic member as in claim 11, wherein the ceramic component is  
2 fashioned in the shape of a semiconductor manufacturing part.

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